

Thrombosis with Thrombocytopenia Syndrome following the MODERNA mRNA COVID-19 Vaccine

Farah Olleik MD¹, Anshul Gupta MD², Farouk Al Chami MD¹, Eric Kasprovicz MD¹

1. Department of Internal Medicine, Lankenau Medical Center
2. Sydney Kimmel Medical college- Thomas Jefferson University

Introduction

Thrombosis with Thrombocytopenia Syndrome (TTS) after vaccination against SARS-COV-2 is a rare syndrome of arterial and/or venous thromboses with concomitant thrombocytopenia first reported after the AstraZeneca adenoviral vector vaccine.

Case Description

A 50-year-old male with no prior medical history, who presents with progressively worsening acute left sided chest pain, associated with diaphoresis, nausea and shortness of breath, 13 days after receiving the first dose of the Moderna COVID-19 vaccine.

Vitals: BP 160/100, HR 86, 100% on RA, afebrile.

Physical exam: Ill appearing African American male

Heart: RRR, no murmurs, PMI not displaced

Lungs: GBAE, no rales or wheezes

Skin: no petechiae or bruising

Labs: Troponin 0.06 increased to >72 ng/ml, platelet count of 65,000 from a baseline of 158,000 in 2016; other cell lineages were unaffected.

ECG: ST elevations in II,III,AVF with reciprocal changes concerning for inferolateral STEMI.

Interventions: Emergent catheterization revealed simultaneous acute total occlusions of proximal to distal RCA and mid LAD requiring PCI with DES. The patient initially received heparin infusion during catheterization and was started on DAPT with Aspirin and Ticagrelor.

Clinical course: Post-procedural course was complicated by partial in-stent thrombosis in both arteries within 24 hours of initial PCI, requiring reintervention (fig 1). On hospital Day 4, his platelet count dropped to a nadir of 37,000 (Fig 2).

Workup: PF4 EIA strongly positive at 3.38 (normal < 0.4) with negative SRA. D-Dimer elevated >20 ug/ml. DIC panel negative. Peripheral smear without schistocytes, low platelets without clumping. Vitamin B12 and folate low at 178 (180 – 914) and 4 (> 5.8) respectively. Methylmalonic acid level normal.

Diagnosis: Diagnosis of TTS was made.

Treatment: The patient was switched to bivalirudin for anticoagulation. He received IVIG 1g/kg for two days in addition to B12 and folate supplementation with good response.

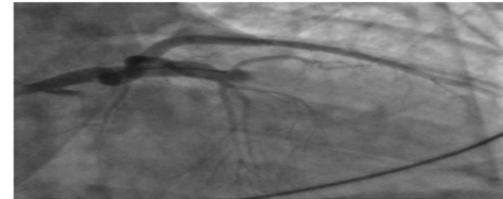


Figure 1a – Completely occluded LAD

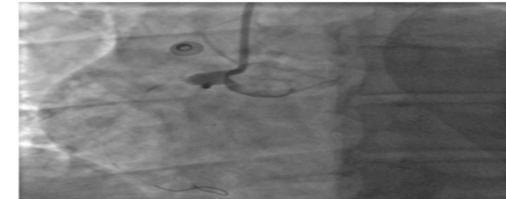


Figure 1b – Completely occluded RCA



Figure 1c – LAD flow s/p initial PCI/DES

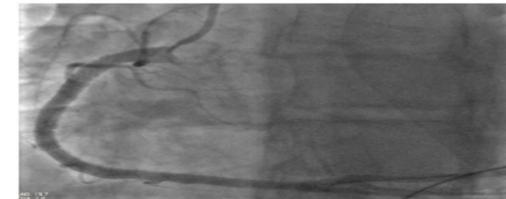


Figure 1d – RCA flow s/p initial PCI/DES

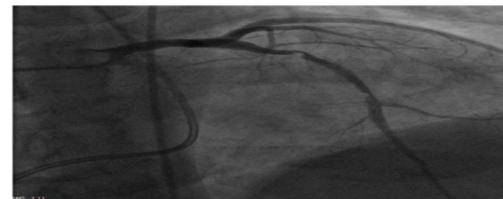


Figure 1e – LAD in-stent thrombosis



Figure 1f – RCA in-stent thrombosis



Figure 1g – LAD s/p re-intervention



Figure 1h – RCA s/p re-intervention

Figure 1 – Cardiac catheterization

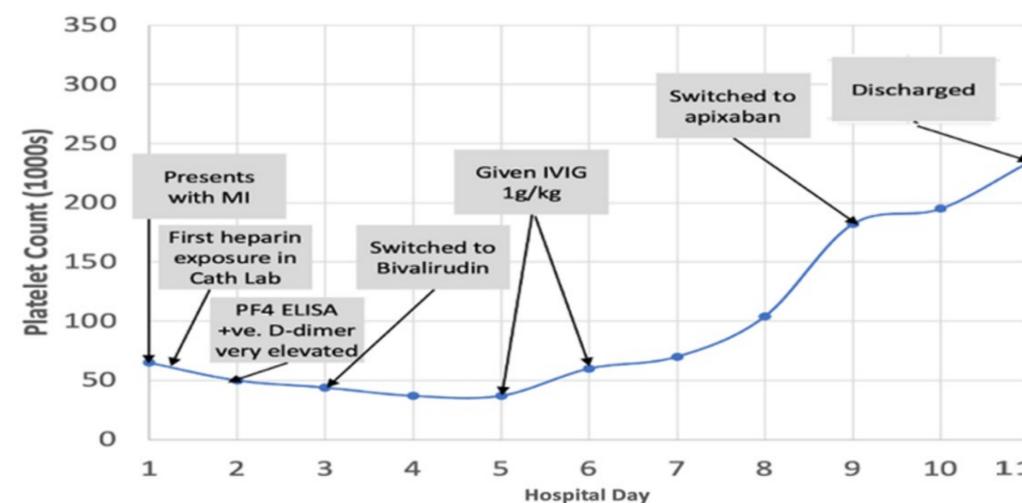


Figure 2 – Platelet count trend with major interventions

Discussion

The American Society of Hematology has five criteria for the diagnosis of TTS:

- A COVID-19 vaccine 4-42 days prior to presentation.
- Venous or arterial thrombosis.
- Thrombocytopenia.
- A positive PF4/Heparin ELISA
- Markedly elevated D-dimer (>4 times upper limit of normal)

The patient's presentation with arterial thromboses, marked thrombocytopenia, elevated D-dimer and a strongly positive PF4 EIA in the setting of recent COVID-19 vaccination made TTS the most plausible diagnosis in accordance with the observed literature and guidelines.

Presence of thrombocytopenia prior to heparin exposure, timing of onset, a strongly positive PF4 EIA with a negative SRA made HIT less likely.

Although there has been reports of Vaccine-induced ITP cases, these has been associated with platelet count of <10000/ μ L on presentation, bleeding and no associated thrombosis, making post-Vaccine ITP less likely.

Treatment for TTS is indicated with IVIG and non- heparin anticoagulation.

Knowledge of this potential side effect is important for appropriate recognition and treatment as knowledge about TTS continues to evolve.

Reference

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